REMARKS

In response to the Office Action mailed September 17, 2004 in the present application, Applicants respectfully request reconsideration.

Claims 1-10 and 12-135 are now pending for examination, with claims 1, 10, 19, 26, 77, 93, 105, 108, 109, and 112-135 being independent claims. Claims 1, 2, 7, 10, 12, 19, 23, 26, 28, 30, 33, 36, 37, 38, 46, 56, 59, 60, 65, 68, 69, 73, 74, 76, 77, 82, 83, 93, 96, and 100 have been amended herein, claim 11 has been cancelled without prejudice or disclaimer as to the subject matter of this claim, and new claims 106-135 have been added. No new matter is added. The application as now presented is believed to be in allowable condition.

A. Allowed/Allowable Subject Matter

Applicants note with appreciation that on page 6 of the Office Action, claim 105 is indicated as allowed.

Also, the Office Action indicates that claims 4, 5, 7-9, 14, 16-18, 21, 23-25, 28, 30-32, 85-92, 96, 98, 99 and 101-104 would be allowable if re-written in independent form including all of the limitations of their respective base claims and any intervening claims. Accordingly, so as to accept subject matter deemed allowable by the Examiner in some of the above-indicated dependent claims, Applicants have added new independent claims 108, 109, 112-117, wherein each new claim includes features recited in an allowable dependent claim, together with its base claim and intervening claims.

In particular, new independent claim 108 includes the subject matter of independent claim 1 and dependent claims 2 and 4 as pending prior to this response.

New independent claim 109 includes the subject matter of independent claim 1 and dependent claims 2 and 7 as pending prior to this response.

New independent claim 112 includes the subject matter of independent claim 10 and dependent claims 11, 12, 13 and 14 as pending prior to this response.

New independent claim 113 includes the subject matter of independent claim 10 and dependent claims 11, 12 and 16 as pending prior to this response.

New independent claim 114 includes the subject matter of independent claim 19 and dependent claim 21 as pending prior to this response.

New independent claim 115 includes the subject matter of independent claim 19 and dependent claim 23 as pending prior to this response.

New independent claim 116 includes the subject matter of independent claim 26 and dependent 28 as pending prior to this response.

New independent claim 117 includes the subject matter of independent claim 26 and dependent claim 30 as pending prior to this response.

Accordingly, new claims 108, 109 and 112-117 are in condition for allowance.

Additionally, the Office Action indicates that claims 39-45, 49, 50 ,52-55, 61-67, 70, 71 and 73-76 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, 2nd paragraph set forth in the Office Action, and to include all of the limitations of their respective base claims and any intervening claims. Accordingly, so as to accept subject matter deemed allowable by the Examiner in these claims, Applicants have added new independent claims 118-135, wherein each of these new claims includes relevant features recited in an allowable dependent claim. Additionally, these new claims are worded so as to overcome the rejections under 35 U.S.C. §112, 2nd paragraph, of any previously pending claims that they incorporate (the rejections under 35 U.S.C. §112, 2nd paragraph, are discussed in greater detail below in the following section). Some of these new claims also have been reworded somewhat from the claims that they incorporate to improve the readability of the resulting claim. The Examiner is encouraged to review each of these new claims on its own merits to verify the patentability of each claim based on the particular language employed. New claims 118-135 have been formed as follows:

Claim 118 includes subject matter from claims 1, 33, 34, 36, 38 and 39 as pending prior to this response.

Claim 119 includes subject matter from claims 1, 33, 34, 36, 38 and 40 as pending prior to this response.

Claim 120 includes subject matter from claims 1, 33, 34, 36, 38 and 41 as pending prior to this response.

Claim 121 includes subject matter from claims 1, 33, 34, 36, 38 and 42 as pending prior to this response.

Claim 122 includes subject matter from claims 1, 33, 34, 36, 38 and 43 as pending prior to this response.

Claim 123 includes subject matter from claims 10, 11, 46, 48 and 49 as pending prior to this response.

Claim 124 includes subject matter from claims 10, 11, 46, 48 and 50 as pending prior to this response.

Claim 125 includes subject matter from claims 10, 11, 46, and 52 as pending prior to this response. The subject matter of claim 48 is not included in claim 125.

Claim 126 includes subject matter from claims 10, 11, 46, and 53 as pending prior to this response. The subject matter of claim 48 is not included in claim 125.

Claim 127 includes subject matter from claims 19, 56, 57 and 61 as pending prior to this response.

Claim 128 includes subject matter from claims 19, 56, 57 and 62 as pending prior to this response.

Claim 129 includes subject matter from claims 19, 56, 57 and 63 as pending prior to this response.

Claim 130 includes subject matter from claims 19, 56, 57 and 64 as pending prior to this response.

Claim 131 includes subject matter from claims 19, 56, 57 and 65 as pending prior to this response.

Claim 132 includes subject matter from claims 26, 68 and 70 as pending prior to this response.

Claim 133 includes subject matter from claims 26, 68 and 71 as pending prior to this response.

Claim 134 includes subject matter from claims 26, 68 and 73 as pending prior to this response.

Claim 135 includes subject matter from claims 26, 68 and 74 as pending prior to this response.

Each of new claims 118-135 is believed to be in condition for allowance.

B. Claim Objections

On page 2 of the Office Action, claims 30-32 were objected to as being of improper dependent form, as these claims depended from claim 12 and duplicated the recitations in claims 16-18, which also depended from claim 12. Accordingly, Applicants have amended claim 30 to depend from claim 26 rather than from claim 12 to overcome this objection.

C. Rejections under 35 U.S.C. §112

On page 2 of the Office Action, claims 33-76 were rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. Applicants respectfully traverse these rejections. While Applicants do not agree that the indicated claims are indefinite, Applicants have amended claims 33, 46, 56 and 68 solely to address the Examiner's concerns so as to expedite prosecution of the application towards allowance. The Applicants nonetheless provide comments below in rebuttal to the indefiniteness rejections.

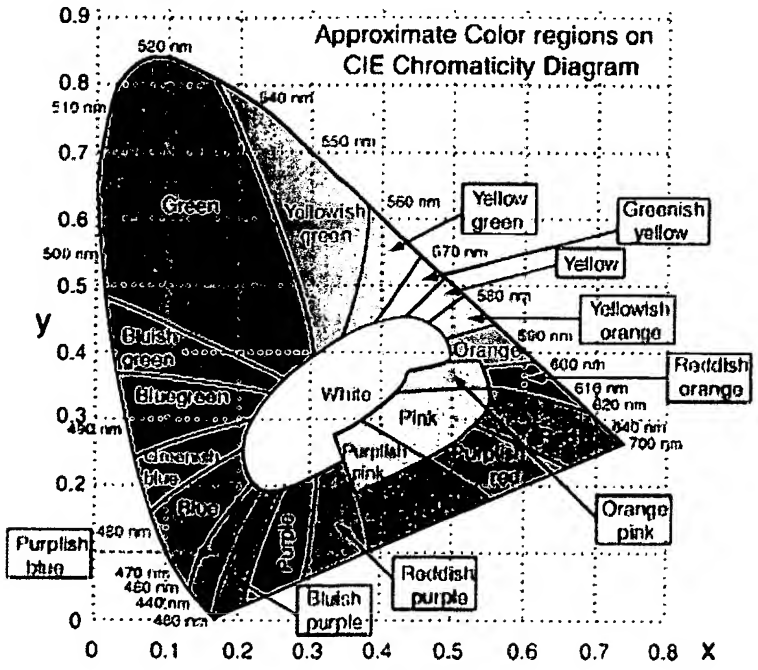
The Office Action states that the term "essentially white" in the context of claims 33, 46, 56 and 68 is allegedly indefinite "since the overall perceivable color is variable, i.e. can be other than white and the specification does not contain guidelines or examples considered sufficient to an artisan to draw a line between white and other colors." (Office Action, page 2). Applicants respectfully disagree with this assertion.

The term "white" when used in connection with light specifies a class of characteristics that would be readily appreciated by one of ordinary skill in the art, as discussed in detail below. Applicants' original use of the terms "essentially white" in various claims was intended to encompass these various characteristics and highlight that white light in general embraces a variety of spectral content and may in fact have different perceivable appearances based on different spectral content, all of which would be objectively referred to as "white" light. Although Applicants have removed the term "essentially" from the indicated claims solely to address the Examiner's concerns, the term "white" as used in the claims as now pending is nonetheless intended to fully embrace the meaning of this term as would be readily appreciated by one of ordinary skill in the art, as discussed below.

Visible light is a collection of electromagnetic waves (electromagnetic radiation) of different wavelengths, wherein each wavelength may be thought of as representing a particular

perceivable "color" of the visible light spectrum. Visible light is generally considered to include waves having a wavelength from approximately 400 nanometers to approximately 700 nanometers, wherein colors generally referred to as deep blue/purple correspond to wavelengths around 400 nanometers and colors generally referred to as dark red correspond to wavelengths around 700 nm. Mixing multiple wavelengths produces additional perceivable colors of light. For example, "white" light is generally considered to include multiple wavelengths throughout the visible spectrum.

The figure below shows a well-known "chromaticity diagram" which represents a system for characterizing color based on mixtures of different visible wavelengths (different specific wavelengths of light are represented along the upper curved perimeter of the diagram)..

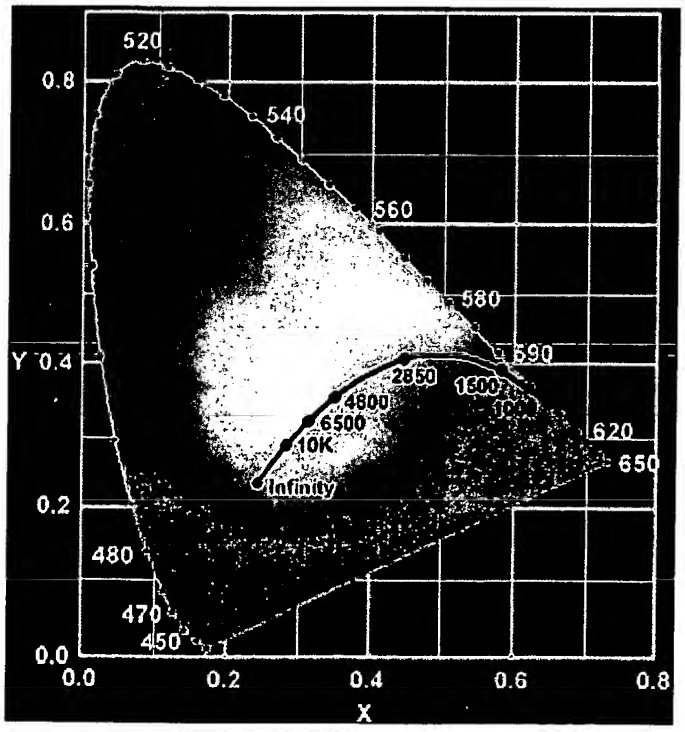


The diagram above represents the commonly-known CIE (Commission Internationale de l'Eclairage) Chromaticity Diagram, which was originally established in 1931 and revised in 1960 and 1976. The CIE diagram characterizes colors by a luminance parameter and two x-y color coordinates (referring to the axes of the diagram). As can be readily observed from the diagram above, the region of the diagram referred to as "white" occupies a noteworthy central region of

the chart, and encompasses many different possible combinations of constituent wavelengths of light.

Due to the importance and ubiquitous nature of white light, there are multiple well-known techniques for characterizing white light which consider how human beings interpret white light. One such well-known characterization of white light employs a classification based on "color temperature," which substantially corresponds to a particular perceivable color characteristic (e.g., hue) of generally white light. More specifically, correlated color temperature is characterized in color reproduction fields according to the temperature in degrees Kelvin (K) of a black body radiator that radiates the same color light as the light in question.

The CIE diagram reproduced below includes what is commonly referred to as a "Planckian locus" (also known as a "black body locus" or "white line") superimposed in the area of the diagram generally attributed to white light. It should be appreciated that the Planckian locus represents merely some examples of white light within the general "white" region indicated in the diagrams above and below. The Planckian locus represents various color temperatures of light from about 1000 degrees K (bottom right of the diagram) to infinity (moving to the left along the locus).



The color temperature of white light specified on the Planckian locus corresponds to a perceivable color quality of the white light. For example, early morning daylight generally has a color temperature of about 3,000 degrees K, while overcast midday skies generally have a color temperature of about 10,000 degrees K. As may be appreciated from the foregoing example, white light having a color temperature of approximately 3,000 degrees K provides a relatively reddish tone to the environment it illuminates, whereas white light having a color temperature of approximately 10,000 degrees K provides a relatively bluish-gray tone. Again, both of the foregoing examples are referred to generally as "white" light, notwithstanding their obviously different spectral content.

In view of the foregoing, the term "white" as used in the claims of the present application is intended to fully embrace the meaning of this term as would be readily appreciated by one of ordinary skill in the art in connection with the color of light.

D. Rejections under 35 U.S.C. §102

On page 3 of the Office Action, claims 1-3, 6, 10-13, 15, 19, 20, 22, 26, 27, 29, 33, 46, 48, 56, 68, 77-79, 84, 93-95 and 97 were rejected under 35 U.S.C. §102(b) as being anticipated by Cochran et al. (U.S. Patent No. 5,365,084).

1. Discussion of Cochran

Cochran is directed to an automated machine vision inspection system configured to ascertain the quality of continuous web-like materials such as cloth, paper, plastics, sheet metal, laminates and the like (col. 1, lines 10-15; col. 7, lines 30-33). In the system of Cochran, with reference to Cochran's Fig. 1, a conveyor continuously moves a web-like material 38 at a generally high speed through a rectangular light field 14 (col. 7, lines 36-38). The light field 14 is generated using a plurality of light emitting diodes (LEDs) 10 that are arranged as a hemi-cylindrical array 16 so as to provide uniform illumination in the rectangular light field 14 (col. 6, lines 21-25). In the system shown in Cochran's Fig. 1, the hemi-cylindrical array 16 of LEDs 10 is fabricated from a flexible printed circuit board (col. 6, lines 25-26). In an alternative arrangement shown in Cochran's Fig. 7, the array of LEDs may be formed by coupling together

multiple planar sections so as to approximate an overall hemi-cylindrical shape for the array (col. 10, lines 9-25). In either case, Cochran discloses that the non-planar or angled lighting provided by such arrangements is advantageously employed for improved detection of certain surface defects in the material under inspection (col. 6, lines 38-42).

In the system of Cochran, the light field 14 impinges on the web material 38 as it passes through the light field, and some of the light is reflected by the web material to form a viewing area 42 (col. 7, lines 40-41). Reflected light in the viewing area 42 is received through a lens 44 of a camera 46 that protrudes through an aperture portion 52 of the hemi-cylindrical array 16 (col. 7, lines 41-42 and lines 50-52). The viewing area 42 is isolated as much as possible from ambient light so that only light originally generated by the array 16, as reflected by the web material 38, impinges on the lens 44 and is recorded by the camera 46 (col. 7, lines 46-49). Image data acquired by the camera 46 is communicated to a computer 62, which processes the image data to determine the acceptability of the web material (col. 8, lines 28-36).

2. Independent Claim 1

Applicants' claim 1, as amended, is directed to an illumination apparatus comprising a first number of first light sources adapted to generate first radiation having a first spectrum, and a second number of second light sources adapted to generate second radiation having a second spectrum different than the first spectrum. The first number of first light sources and the second number of second light sources are different. Claim 1 also recites, *inter alia*, that the apparatus is configured to provide ambient illumination including visible radiation in an environment to be occupied by an observer of the ambient illumination, wherein the visible radiation includes at least one of the first radiation and the second radiation.

Cochran fails to disclose or suggest the apparatus of claim 1; in fact, Cochran essentially teaches away from such an apparatus. In particular, it is noteworthy that Cochran's inspection system is specifically designed such that any light generated by Cochran's system cannot provide ambient illumination, as required by claim 1. Rather, Cochran specifically discloses that the area in which any light is generated in Cochran's inspection system is to be isolated as much as possible from the ambient. Stated differently, any light generated in Cochran is specifically intended to impinge only on a sample material under inspection, and not at all intended to

provide ambient illumination in an environment to be occupied by an observer, as recited in claim 1. Furthermore, isolation of the light generated in the system of Cochran is essential for proper image acquisition by the camera and subsequent image processing by the computer to determine the acceptability of the subject material under inspection.

For at least the foregoing reasons, claim 1 patentably distinguishes over Cochran and is in condition for allowance. Therefore, the rejection of claim 1 under 35 U.S.C. 102(b) as being anticipated by Cochran should be withdrawn.

Claims 2-9, 33-45, 106 and 107 depend from claim 1 and are allowable based at least upon their dependency. Claim 33 has been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, discussed above. Claims 2, 7, and 36-38 include minor amendments to account for amendments to claim 1, so as to ensure proper antecedent basis for various claimed features.

3. Independent Claim 10

Applicants' claim 10, as amended, is directed to an illumination method, comprising acts of generating first radiation having a first spectrum from a first number of first light sources, and generating second radiation having a second spectrum different than the first spectrum from a second number of second light sources, wherein the first number and the second number are different. The method of claim 10 also comprises an act of mixing at least a portion of the first radiation and a portion of the second radiation so as to provide ambient illumination including visible radiation in an environment to be occupied by an observer of the ambient illumination, the visible radiation including at least one of the first radiation and the second radiation.

As with claim 1, Cochran fails to disclose or suggest the method of claim 10. In particular, any light generated in Cochran is specifically intended to impinge only on a sample material under inspection, and not at all intended to provide ambient illumination in an environment to be occupied by an observer, as recited in claim 10. Accordingly, for reasons similar to those discussed above in connection with claim 1, claim 10 patentably distinguishes over Cochran and is in condition for allowance. Therefore, the rejection of claim 10 under 35 U.S.C. 102(b) as being anticipated by Cochran should be withdrawn.

Claims 12-18, 46-55, 110 and 111 depend from claim 10 and are allowable based at least upon their dependency. Claim 46 has been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, discussed above. Claim 12 includes minor amendments to account for amendments to claim 10, so as to ensure proper antecedent basis and dependency.

4. Independent Claim 19

Applicants' claim 19, as amended, is directed to an illumination apparatus, comprising a plurality of first light sources adapted to generate first radiation having a first spectrum, and a plurality of second light sources adapted to generate second radiation having a second spectrum different than the first spectrum. Claim 19 also recites, *inter alia*, an essentially inflexible planar substrate on which all of the first light sources and all of the second light sources are mounted such that the apparatus is configured to provide ambient illumination including visible radiation in an environment to be occupied by an observer of the ambient illumination, the visible radiation including at least one of the first radiation and the second radiation.

For reasons similar to those discussed above in connection with claims 1 and 10, Cochran fails to disclose or suggest the apparatus of claim 19. Furthermore, Cochran fails to disclose or suggest an essentially inflexible planar substrate on which all of the first light sources and all of the second light sources are mounted, as recited in claim 19. Rather, in one embodiment, Cochran discloses a hemi-cylindrical flexible printed circuit board that serves as a substrate for LEDs. In another embodiment, Cochran discloses an LED array formed by coupling together multiple planar sections so as to approximate an overall hemi-cylindrical shape for the array. In either case, Cochran fails to disclose an essentially planar substrate on which all first light sources and all second light sources are mounted.

For at least the foregoing reasons, claim 19 patentably distinguishes over Cochran and is in condition for allowance. Therefore, the rejection of claim 19 under 35 U.S.C. 102(b) as being anticipated by Cochran should be withdrawn.

Claims 20-25 and 56-67 depend from claim 19 and are allowable based at least upon their dependency. Claim 56 has been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, discussed above. Claims 23, 59, 60 and 65 include minor amendments to account for amendments to claim 19, so as to ensure proper antecedent basis and dependencies.

5. Independent Claim 26

Applicants' claim 26, as amended, is directed to an illumination method, comprising acts of generating first radiation having a first spectrum from a plurality of first light sources, and generating second radiation having a second spectrum different than the first spectrum from a plurality of second light sources. The method of claim 26 further recites, *inter alia*, coupling the first light sources and second light sources via an essentially planar inflexible substrate so as to provide ambient illumination including visible radiation in an environment to be occupied by an observer of the ambient illumination, the visible radiation including at least one of the first radiation and the second radiation.

For reasons similar to those discussed above in connection with claim 19, claim 26 patentably distinguishes over Cochran and is in condition for allowance. Therefore, the rejection of claim 26 under 35 U.S.C. 102(b) as being anticipated by Cochran should be withdrawn.

Claims 27-32 and 68-76 depend from claim 26 and are allowable based at least upon their dependency. Claim 68 has been amended to overcome the rejection under 35 U.S.C. §112, second paragraph, discussed above. Claims 28, 30, 68, 69, 73, 74, and 76 include minor amendments to account for amendments to claim 26, so as to ensure proper antecedent basis and dependencies.

6. Independent Claim 77

Applicants' claim 77, as amended, is directed to an illumination apparatus, comprising a plurality of first LEDs adapted to generate first radiation having a first spectrum, a plurality of second LEDs adapted to generate second radiation having a second spectrum different than the first spectrum, and an essentially inflexible planar substrate on which all of the first LEDs and all of the second LEDs are mounted. The apparatus further comprises at least one controller coupled to the plurality of first LEDs and the plurality of second LEDs and configured to independently control at least a first intensity of the first radiation and a second intensity of the second radiation such that an overall perceivable color of visible radiation generated by the illumination apparatus is white.

As in claims 19 and 26, claim 77 recites an essentially inflexible planar substrate on which all of the first LEDs and all of the second LEDs are mounted. Accordingly, since Cochran

fails to disclose or suggest this feature as discussed above, claim 77 patentably distinguishes over Cochran for at least this reason.

With respect to the limitation "an overall perceivable color of visible radiation generated by the illumination apparatus is white" as recited in claim 77, the Office Action alleges on page 4 that this limitation is inherently disclosed in Cochran, "since the colored LEDs when combined can generate any color including white depending on their selected wavelengths." While Applicants agree generally that combinations of differently colored light generated by LEDs can provide white light (e.g., as indicated in Applicant's specification), Applicants nonetheless respectfully disagree that Cochran inherently discloses any apparatus in which an overall perceivable color of visible radiation generated by the apparatus is white, as recited in claim 77.

As set forth in MPEP §2112, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic (citing *In re Rijckaert*, 9 F.3d 1531, 1534, Fed. Cir. 1993) (emphasis original). Rather, MPEP §2112 states that "to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities" (citing *In re Robertson*, 169 F.3d 743, 745, Fed Cir. 1999). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art" (citing *Ex parte Levy*, 17 USPQ2d 1461, 1464, Bd. Pat. App. & Inter. 1990) (emphasis original).

Applicants respectfully submit that the disclosure and teachings of Cochran do not reasonably support a determination that the generation of white light is necessarily present in Cochran's video inspection system. Specifically, nowhere in the reference does Cochran disclose or suggest the generation of white light for any purpose. In one instance, Cochran mentions the use of mixed spectra "which are advantageously implemented to specific inspections," such as to provide three-dimensional information (col. 5, lines 21-24). Cochran expands upon the idea of using "multiple chroma" for purposes of inspecting diverse sample materials, and provides a specific example of an inspection system in which both red and amber light is generated to be projected onto a material of interest (col. 10, line 40 – col. 11, line 48).

Cochran also mentions the use of multiple cameras "with sensitivity to selected spectrum to isolate various spectral influences or anomalies which are suitably illuminated with one spectrum and another with a second or third," and using selected charge-coupled-devices, arrays, filters or splitters to facilitate imaging of only one desired spectrum of light with a given camera (col. 5, lines 25-31; col. 12, line 42 – col. 13, line 29).

Accordingly, in the teachings of Cochran relating to the generation of multiple spectra of light, Cochran emphasizes that imaging of light to recover information about a material under inspection must be accomplished in a way that ultimately segregates any different spectra of light generated, so that only a given color is imaged by a given camera at a given time (col. 12, lines 63-68). Again, nowhere in the reference does Cochran refer in any way to the generation of white light.

In view of the foregoing, one of ordinary skill in the art would readily appreciate that the generation of white light does not necessarily flow from the teachings of Cochran. Accordingly, Applicants respectfully believe that the rejection of claim 77 based on an allegation of such an inherent teaching in Cochran cannot be sustained. Therefore, for this additional reason, the rejection of claim 77 under 35 U.S.C. 102(b) as being anticipated by Cochran should be withdrawn.

Claims 78-92 depend from claim 77 and are allowable based at least upon their dependency. Claims 82 and 83 include minor amendments in light of amendments to claim 77.

7. Independent Claim 93

Applicants' claim 93, as amended, is directed to an illumination method, comprising acts of generating first radiation having a first spectrum from a plurality of first LEDs, generating second radiation having a second spectrum different than the first spectrum from a plurality of second LEDs, mixing at least a portion of the first radiation and a portion of the second radiation to provide visible radiation having an overall perceivable color, and independently controlling at least a first intensity of the first radiation and a second intensity of the second radiation such that the overall perceivable color of the visible radiation is white. Claim 93 further recites coupling the first light sources and second light sources via an essentially planar inflexible substrate.

For reasons similar to those discussed above in connection with claim 77, claim 93 patentably distinguishes over Cochran and is in condition for allowance. Claim 94-104 depend from claim 93 and are allowable based at least upon their dependency. Claim 96 and 100 include minor amendments in light of amendments to claim 93.

E. Rejections under 35 U.S.C. §103

On page 4 of the Office Action, claims 34-38, 47, 51, 57-60, 69, 72, 80-83, 96 and 100 were rejected under 35 U.S.C. §103(a) as allegedly being obvious over Cochran in view of Ruskouski (U.S. Patent No. 5,655,830). Applicants respectfully traverse these rejections. In any case, as each of these claims is believed to depend from an allowable base claim as discussed above, the rejections under 35 U.S.C. §103 are believed to be moot. Applicants reserve the right to discuss the impropriety of any rejections of these claims based on the cited references, including the impropriety of the combination of Cochran and Ruskouski, if deemed necessary in the future.

F. Conclusion

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below to discuss any outstanding issues relating to the allowability of the application.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/2762.

Respectfully submitted,

George G. Mueller, et al.

By: _____

Joseph Veja, Jr., Reg. No. 45,157
LOWRIE, LANDO & ANASTASI, LLP
One Main Street
Cambridge, Massachusetts 02142
United States of America
Telephone: 617-395-7000
Facsimile: 617-395-7070

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